J. A. & B. A. JEFFERY.

PROCESS OF MANUFACTURING PORCELAIN ARTICLES.

APPLICATION FILED AUG. 18, 1909. RENEWED JULY 12, 1915.

1,171,205.

Patented Feb. 8, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

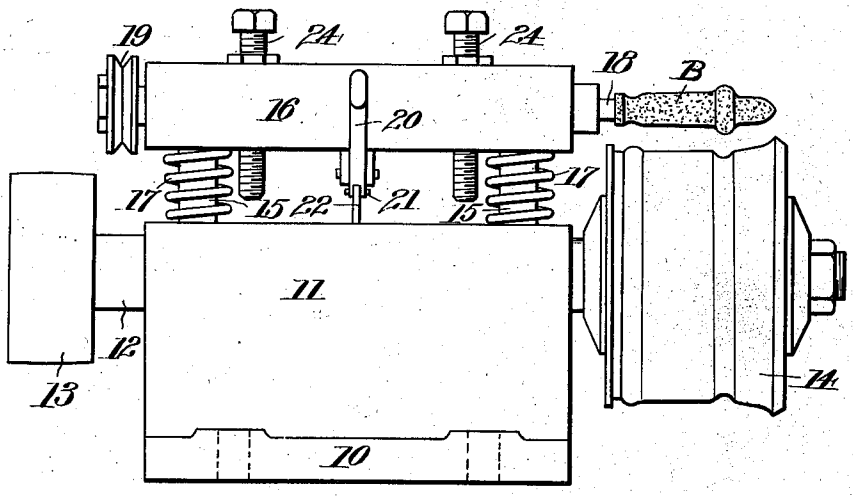


Fig. 2.

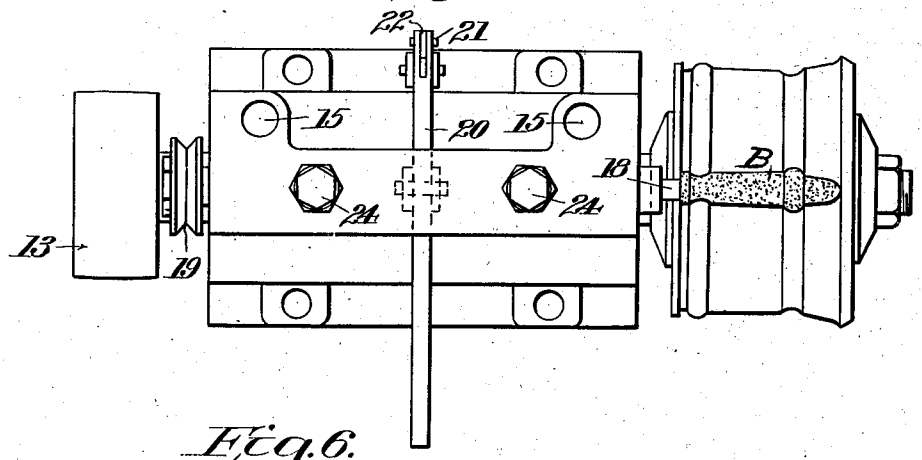
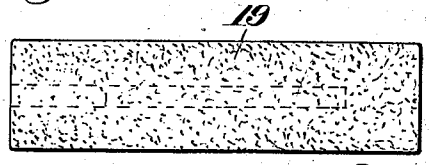


Fig. 6.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

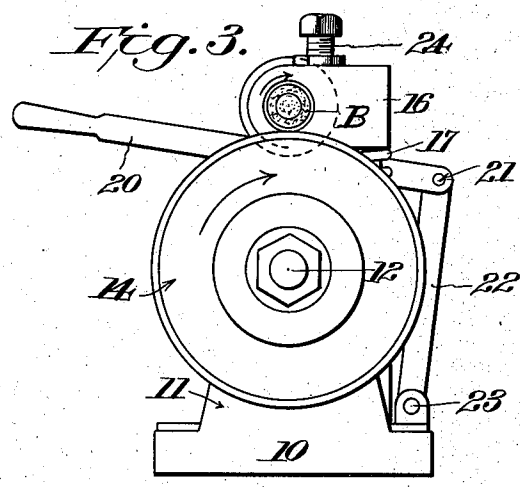
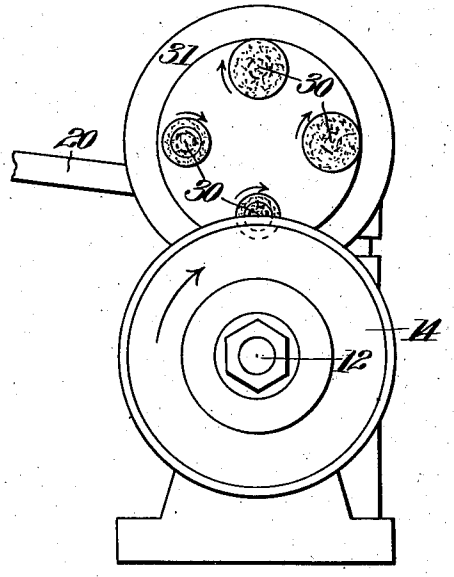


Fig. 4.



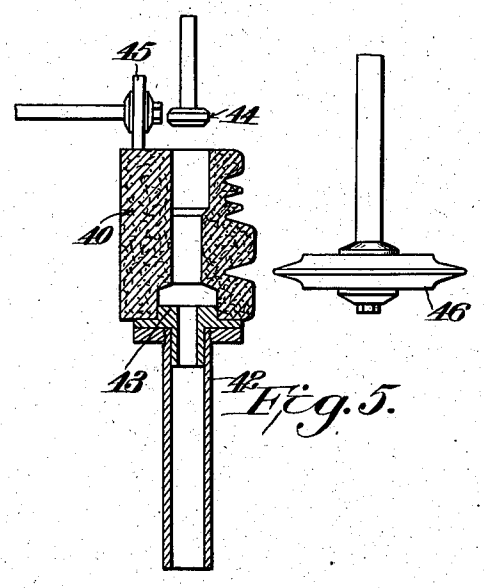


Fig. 5.

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PROCESS OF MANUFACTURING PORCELAIN ARTICLES.

1,171,205. Specification of Letters Patent. Patented Feb. 8, 1916.

Application filed August 18, 1909, Serial No. 513,512. Renewed July 12, 1915. Serial No. 39,519.

To all whom it may concern:

Be it known that we, JOSEPH A. JEFFERY, and BENJAMIN A. JEFFERY, of Newark, in the county of Essex, State of New Jersey, have invented certain new and use Improvements in Processes of Manufacturing Porcelain Articles, of which the following is a specification.

This invention relates to certain new and useful improvements in the art of manufacturing porcelain articles.

Heretofore in the manufacture of porcelain articles such as spark plugs, insulators and the like it has been the custom to take the soft clay and mold, "throw" it, or otherwise shape it approximately to the desired contour, and then after allowing it to stand until it reaches what is known as "green" or half-hard condition it is placed upon a spindle, or otherwise attached to a suitable revolving element and shaped to the exact contour desired by means of steel tools held in the hands or otherwise positioned over the surface of the clay. After the blank has been reduced to the proper size it is allowed to dry and then dipped into a suitable glaze or placed directly into the kiln and fired. This practice results in a great percentage of loss by reason of the fact that the material has to be allowed to become "white hard" or "bone dry," before being placed in the kiln for firing. Furthermore a considerable variation in the dimensions in the finished or fired ware results from the fact that there is no accurate means of determining the exact time when a piece of clay or what we term a blank, has reached the half-hard or green condition, this condition depending as it does on the amount of water or moisture the blank may contain. Consequently few if any of the blanks contain the same percentage of water or moisture when turned or given the desired contour, and when placed aside to dry before firing a considerable variation of the dimensions will result and accordingly a large percentage of variation in the dimensions of the finished ware must be expected. Usually in the process of turning the piece is so shaped that the cross section of some parts is much heavier and more massive than others. In some instances cracks are formed in the drying process, and in others a settling and warping occurs due in the first case to the light sections drying more rapidly than the heavier and consequently cracking; and in the second case the weight of the piece compressing the lighter sections unevenly.

The object of the present invention is to overcome these objections by first allowing the blank of the clay comprising the porcelain to become "white hard" or "bone dry." The dry blank is then shaped to conform to the desired contour and then baked or dried in the usual manner. By following out this process the uncertain shrinking, uncertain because it is impossible to judge the exact percentage of moisture in the clay while being turned, is replaced by a known and uniform shrinkage which is that between the "white dry" and the dried or finished state. Therefore the percentage of loss by reason of distortion or uneven shrinkage of different portions of the completed article is reduced to a minimum.

The invention will be hereinafter fully set forth and particularly pointed out in the claims. In the accompanying drawings:—Figure 1 is a front view illustrating our improved apparatus. Fig. 2 is a plan view thereof. Fig. 3 is an end view. Fig. 4 is an end view illustrating the slight modification. Fig. 5 is a sectional view illustrating the second modification. Fig. 6 is a view illustrating the "dry" blank before shaping.

Referring to the drawings, 10 designates a base or casting of any suitable or preferred form provided with bearings 11 supporting a shaft 12. Said shaft is rotated by means of a pulley 13 receiving power from any suitable source. Secured to the shaft 12 is an abrasive wheel 14 the periphery of which is provided with grooves and ribs to form a pattern conforming to the shape that is desired to give the work. We have found that excellent results are secured by using a wheel for this purpose constructed of carborundum although we do not desire to limit ourselves in this particular as it is quite obvious that a wheel or drum may be made of any suitable material and provided with a surface of abrasive material.

Mounted on rods 15 working in the base 10 is a carriage 16 the weight of which is normally supported by springs 17 encircling said rods. Said carriage is provided with suitable bearings for a shaft 18 rotated by means of a pulley 19 receiving power from any suitable source. The shaft 18 projects over the wheel 14 to form a mandrel for the porcelain blank 19. In the drawings the work 19 is illustrated as a porcelain spark plug and the abrasive wheel 14 is of a pattern conforming to the same. Connected to the carriage 16 is a lever 20 pivoted at 21 to a lever 22 which in turn is pivoted at 23 to the base 10. Said lever is for the purpose of depressing the carriage to bring the blank 19 in contact with the wheel 14. Screws 24 mounted in the carriage 16 serve to limit the movement of the carriage 16 in order to regulate the diameter of the work.

In practice the clay is worked in the usual manner by hand, and finally shaped into cylindrical blanks, such as illustrated in Fig. 6, and the green blank is then laid aside until it dries to rather a hard condition which we term "white" or "bone dry." In this state the clay has become quite hard, and will retain its shape while being handled. A longitudinal bore is formed in the blank in any suitable manner while in the green state or may be ground or otherwise suitably formed in the dry clay. After the blank has become sufficiently hard, it is placed upon the mandrel 18 and the lever operated to depress the carriage 16, thereby bringing the blank in contact with the abrasive wheel 14 which will act upon, cut or grind the surface of the blank and shape the latter to conform to the pattern of the former. In carrying out our invention it is our intention to substitute abrasive wheels of different patterns to conform to the work desired, the wheel 14 being shown as removably secured in position.

In Fig. 4 we have shown a slight modification which consists in employing a plurality of mandrels 30 to receive the work, said mandrels being each rotatably mounted in a revolving head 31 and coöperating with an abrasive wheel 14 as heretofore described. In practice the mandrels are successively brought around in position to bring the blank into engagement with the abrasive wheel 14, the operation being otherwise the same as in connection with Fig. 1. By this arrangement the capacity of the apparatus is greatly increased. In Fig. 5 we have shown the modification in which the spindle is supported in a vertical position. In this form the blank 40 rests upon the revoluble face plate carried by a spindle 42 and provided with a mandrel 43. An abrasive wheel 44 may be provided for shaping the bore of the blank, a second abrasive wheel 45 may be provided for shaping the top of the blank and a pattern wheel 46 is provided for engaging the periphery of the blank. The advantage of this form is that large pieces of clay, which may weigh up to two hundred pounds or more, can be handled much more easily and with less chance of breakage than would be the case if the spindle were horizontal. When placed on a horizontal spindle or arbor the work depends, for traction on fitting tightly in the arbor. This not only strains the clay causing cracks to develop but may actually break it open. The horizontal arrangement therefore is best adapted for light work. On the vertical spindle the work rests on the revolving face plate which gets its traction by reason of its weight. The pattern wheel 46 may be formed so as to give a finished shape to the work by feeding it transversely into engagement therewith as heretofore described, or it may be operated as indicated in Fig. 5 by traversing longitudinally of the blank combined with a transverse feeding of the wheel, with a part of the profile formed on the latter. If desired the holes and grooves may be roughly formed in soft clay and afterward ground to finished form when the clay becomes dry. It is understood that ordinarily an abrasive wheel carrying the counter form of the piece desired is to be used on this vertical form of machine.

We desire to have it further understood that while we have illustrated in the drawings certain mechanisms adapted to carry out our improved process of manufacturing porcelain blanks, said drawings are intended for illustrative purposes only and we do not limit ourselves thereto. It is quite obvious that the said process may be carried out in conjunction with various other forms of mechanism without departing from the spirit of our invention.

We claim as our invention:—

1. An improvement in the art of manufacturing porcelain articles comprising producing blanks of green clay, allowing said blanks to become dry and hard, imparting the desired shape to said blanks while in the dry and hard condition by grinding off portions of the surface thereof and then firing.

2. An improvement in the art of manufacturing porcelain articles comprising producing blanks of plastic clay, allowing said blanks to stand until they are bone dry and brittle, grinding off the surfaces of the blanks throughout the length thereof to impart the desired shape to said blanks while in the dry and brittle condition and then firing.

3. An improvement in the art of manufacturing porcelain articles comprising pro-

ducing approximately cylindrical blanks of plastic green clay, allowing the same to stand until bone dry, grinding the surfaces of the blanks to impart an irregular contour of circular cross section to said blanks while in the bone dry condition and then firing.

In testimony whereof, we have signed this specification in the presence of two subscribing witnesses.

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Witnesses:
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JOSEPH S. SUTPHEN.